APPENDIX 32-c
PLANT INFORMATION

ANNUAL GRASSES AND GRAINS -

Small grains are cool season annual grasses primarily grown for animal feed and human consumption. The grains used for soil stabilization are primarily Rye and Oats. Foxtail Millet, which is sometimes considered a small grain, is becoming a very popular and successful planting for soil stabilization.

1. Oats (Avenasativa): A cool season annual grass primarily grown for animal feed and human consumption, but also used for soil stabilization. Seeding rates are 112 kg per hectare bare ground or 11 kg per 1,000 square meter (100 lbs per acre or 2-1/2 lbs. per 1000 square feet.

2. Rye (Secale cereale): Often referred to as Winter Rye because of its winter hardiness, Rye is the most common small grain used for soil stabilization. It is also the most productive grain on dry, infertile, acid or sandy soils. It may be seeded in the fall for winter ground cover. By maturing early, it offers less competition during the late spring period, a critical time in the establishment of perennial species. Rye grain germinates quickly and is tolerant of poor soils. Including Rye grain in fall-seeded mixtures is almost always advantageous, but it is particularly helpful on difficult and erodible soils, erodible slopes or when seeding is late. Recomended rates are up to 112 kg per hectare (100 lbs per acre) for bare ground. Overly thick stands of Rye grain will suppress the growth of perennial seedlings. Approximately 56 kg per hectare (50 lbs per acre) is the maximum for this purpose and, where lush growth is expected, that rate should either be cut in half, or Rye grain should be totally eliminated from the mixture.

3. Foxtail Millet (Setaria italics): A warm season annual grass which may be used for temporary cover. German Millet germinates quickly and goes to seed quickly. These features make it an excellent companion grass for summer seedlings. It dies at first frost. Seeding rates are up to 56 kg per hectare (50 lbs. per acre) for temporary cover. Use 11 to 22 kg per hectare (10 to 20 lbs per acre) in mixes.

4. Annual Rye (Lolium multiflorum): A cool season annual grass used for temporary cover or as a nurse grass to allow for germination of permanent stands. Most commonly used in mixes for erosion control. Performs well in neutral to slightly acid soils. Use rates up to 112 kg per hectare (100 lbs per acre) for temporary cover. Use 11 to 22 kg per hectare (10 to 20 lbs per acre) in mixes.

ANNUAL LEGUMES -

1. Annual Lespedezas (Lespedeza striata)

Uses: Pasture, hay, erosion control soil improvement, wildlife food.

Description: Annual warm season legumes. Korean Lespedeza is larger and coarser than Common Lespedeza and grows to about 300 millimeters (12 inches). Seed of Korean is shiny and black, while seed of Common is stippled. Kobe is the most desirable variety of Common Lespedeza.

Adaptation: Optimum pH range is 6.0 to 6.5; will grow from 5.5 to 7.0. Will grow in soil textures ranging from sands to clays and through a wide range of fertility conditions.

Establishment: Seed should always be inoculated. May be seeded alone or mixed with grasses or small grains. Requires a firm seedbed; may be broadcast or drilled. Should be seeded in early spring at28 to 45 kg per hectare (25 to 40 lbs per acre) or 2 to 5 kg per 1,000 square meters (0.5 to 1 lb per 1,000 square feet), depending on use. (Use lower figure as half the seeding rate of any spring seeding with grass or grain.) Should not be mowed at less than 75 millimeters (3 inches). Lespedeza will not make a large contribution in sod grasses like Bluegrass; they do best in open sod grasses like tall fescue.

Sources: Seed of common variety (Kobe) and Korean varieties (Climax, Harbin and Rowan) are commercially available.

PERENNIALS -

1. Tall Fescue (Festuca arundinacea) -

Uses: Pasture, hay, recreation areas, lawns and stabilization of waterways, banks, slopes, cuts, fills, and spoils. It is the most widely used grass at this time for stabilizing large disturbed areas.

Description: A robust, cool season, long-lived, deep-rooted bunchy grass which may have short rhizomes (underground stems). Kentucky 31 is the best-known variety. A number of new varieties of Tall Fescue are becoming available for lawn and other fine-turf uses, and several offer definite improvements. However, their higher cost over the old standby, KY 31, is seldom justified when used for purposes of stabilization and erosion control.

Tall Fescue tolerates a wide range of seeding dates; however, with the possible exception of high mountain elevation, it is most dependable when planted in fall.

Adaptation: Adapted to a wide range of climatic conditions. Optimum pH range is 6.0 to 7.0; will tolerate from 3.0 to 8.0. Will grow on shallow and claypan soils if they are moist. Growth is limited more by moisture than by temperature extremes, but it will tolerate drought, infertile soils and moderate shade.

Establishment: Requires a firm seedbed. Hydroseeding is successful. Seeding rates vary from 112 kg per hectare (100 lbs per acre) for erosion control to 280 kg per hectare (250 lbs per acre) for lawns. Plant in early spring or from the middle of August through September. Legumes may not thrive in fescue stands due to the aggressive growth habits of this grass. Mowing is desirable on critical areas at least once every two years; lack of periodic mowing will encourage clumpiness.

Sources: Readily available as seed and sod.

2. Kentucky Bluegrass (Poa pratense) -

Use: Pasture, turf for lawns, athletic fields, golf courses, and playgrounds. Also used to stabilize waterways, slopes, cuts and fills. Choice food for grouse, turkeys, deer and rabbits.

Description: Long-lived, cool season perennial grass which forms a dense sod. Becomes dormant in the heat of summer since its growing season is spring and fall.

Adaptation: Best adapted to well drained, fertile soils of limestone origin. Optimum pH range is 6.0 to 7.0. Bluegrasses are better suited to high maintenance situations in the transition zone. Essentially dormant during dry or hot weather; however, it will normally survive severe drought.

Establishment: Requires a firm, weed-free seedbed and adequate fertilization (liberal phosphorus) and lime are important. Can be used with Tall Fescues at low rates. Minimum mowing height is 40 millimeters (1.5 inches). Critical erosion areas may be mowed only once per year, if desired. This grass is usually seeded with a mixture of other grasses or legumes; several varieties of Bluegrass should be used together to ensure good stand survival. Bare

ground rates are 135 kg per hectare (120 lbs per acre). Overseed 5 to 8 kg per 1,000 square meters (1 to 1.5 lbs per 1000 square feet).

Sources: Readily available as seed and sod.

3. Perennial Ryegrass (Lolium perrenne) -

Uses: Erosion control, soil improvement lawns, pasture, and hay; newer varieties are excellent for high-traffic areas.

Description: Perennial Ryegrasses are an excellent selection where rapid establishment is desired. Cool season. Ryegrasses cross-pollinate freely so "Common Ryegrass" may be a mixture of annual and perennial species. Certified seed of Perennial Ryegrass varieties is produced: Blaser, Palmer, Goalie, Fiesta II, Ranger, Regal and Pennfine may be used.

Adaptation: Grows best on dark, rich soils in mild climates. Newer varieties have good drought tolerance but may require irrigation if under drought stress or heavy traffic. Will tolerate wet soils with good surface drainage.

Establishment: A firm, mellow surface over compact subsoils gives good results. Seed in fall or spring. Perennial Ryegrass may also be seeded in mid-August to early September. For turf, use a rate of 25 to 40 kg per 1,000 square meters (5 to 8 lbs per 1,000 square feet), if seeded alone; lesser amounts are suitable in mixtures, depending on the characteristics of the companion species. Generally not seeded alone except on athletic fields with intensive use. Perennial Ryegrass does best when used with bluegrass as 20 percent or less of the mixture. Ryegrasses germinate rapidly which makes them particularly suited to disturbed-area stabilization and temporary seeding. They will, however, tend to dominate stands in mixtures if percentage is too high.

Sources: Readily available commercially. Care should be taken to buy seed appropriate to the needs of the project.

4. Fine Fescues
   Red Fescue
   Hard Fescue
   Chewings Fescue

Uses: Excellent for shady, low maintenance areas and north-facing slopes. May be used to stabilize waterways, slopes, banks, cuts, fills, and as a cover crop in orchards.

Description: Red Fescue is a cool season perennial that occurs in two forms: bunchtype and creeping. Creeping Red Fescue forms a tight sod. The leaves of Red Fescue are narrow and wiry. Hard Fescues are slow-growing with excellent shade tolerance.

Adaptation: Shade tolerant and somewhat drought-resistant once established. Grows well in sandy and acidic soils. Optimum pH range is 4.5 to 6.0. Prefers well drained soils but requires adequate moisture for establishment. In areas of high temperature and humidity, some Fine Fescues may turn brown or deteriorate during the summer. Newer varieties of Hard Fescue are more drought tolerant.

Establishment: Rarely seeded in pure stands. Seedbed preparation and fertility adjustments are usually dictated by the other grasses in the mixture. Red Fescues may comprise 25 to 60% by weight of a seeding mixture. In shaded areas red fescue may be the key grass in the mixture. Mowing consistently below 40 millimeters (1.5 inches) is not recommended.

Sources: Readily available commercially. New Hard Fescues may be in short supply.

5. Bermudagrass (Cynodon dactylion)

Uses: Soil and water conservation, pasture, hay, silage, lawns, both high maintenance and general purpose turf, and stabilization of grassed waterways.

Description: A long-lived, warm season perennial that spreads by stolons and rhizomes (runners and underground stems). Height of stems of Common Bermudagrass may be 300 millimeters (12 inches). The stems are short-jointed and the leaves flat and spreading. Common Bermudagrass may be established vegetatively with sprigs (sections of stems) or from seeds; however, it has the potential to develop into a weed problem because it spreads vigorously. Cold-tolerant hybrids are usually specified. These are traditionally established from sprigs or sod, but seed is now available.

Adaptation: Makes its best growth when average daily temperatures are above 24 degrees Celsius (75 degrees Fahrenheit). Grows on a wide range of soils from heavy clays to deep sands. Optimum pH is 6.0 to 6.5. It is drought-resistant and salt-tolerant. Tolerates floods of short duration but will not thrive on waterlogged soils; does not persist under heavy shade. For rough areas, the varieties Midland (a forage hybrid) and Coastal are recommended. For fine-turf areas, Tufcote (a fine-leaved turf hybrid), Midiron, Tifway, and Vamont are used.

Establishment: By sodding or planting sprigs. Sprigs should be planted (by hand or machine) when soil is warm in a well-prepared, moist seedbed. One end of the sprig should extend above ground, and the other should be covered by firmly packed soil.

Sources: Readily available as seed, sprigs, and sod.

6. Reed Canarygrass (Phalaris arundinacea)

Pasture, hay silage, and erosion control. An excellent grass for stabilizing waterways, healing and controlling gullies, and protecting shorelines of ponds and reservoirs from wave action. Also provides good cover for shooting preserves. Can be used in deep gullies and drainage ditches where stream flow is rapid. Vigorous growth may impede flow in small, low velocity channels.

Description: A long-lived, cool season, clumpy perennial with coarse rhizomes (underground stems). Grows 1 to 2 meters (4 to 7 feet) tall. Most widely used variety is loreed.

Adaptation: Does best in a cool, moist climate. Makes best growth on fertile, moist, medium to fine soils; but will grow in a wide range of soil moisture conditions. Will also grow well on swampy or floodplain soils consisting of peat, muck or sand. Will withstand flooding, yet is quite drought-tolerant when mature. Optimum pH range 5.0 to 7.5.

Establishment: Requires a well-prepared seedbed that is firm and weed free. Seed in spring or late summer; drill seed alone or with a legume. Seed must fresh it should be labeled as having at least 70% germination tested within the last 6 months. Normally, pure stands should be established because this grass is not very compatible with other plants. Mowing should not occur more than twice a year on stabilized critical erosion areas or waterway as this will result in reduced stands.

Sources: Available commercially.

MISCELLANEOUS EROSION CONTROL GRASSES -

1. Weeping Lovegrass (Eragrostis curvula)

Uses: Fast-growing cover for erosion control. In the northeast, weeping lovegrass acts as a summer annual. The normal life of 3 to 5 years may be

foreshortened by low winter temperatures. May provide permanent cover on southern exposure.

Description: A rapid-growing, warm season bunch grass introduced from East Africa. The long, narrow leaves are numerous, very fine, and droop over to the ground, hence the name. Leaf height is rarely above 300 millimeters (12 inches).

Adaptation: Prefers light-textured, well-drained soil; will thrive on soil of low fertility. Low winter temperatures may deplete stand.

Establishment: Easy to establish by seed; germinates rapidly and grows quickly. Lime and fertilizer needs are similar to those of Tall Fescue and Ryegrass. Requires pH of 5.5 or higher. May be planted any time after danger of frost and throughout the summer. Very fine seed, commonly added to erosion control seed mixtures. Use of hydroseeders is successful if the seeding rate is increased to compensate for the lack of a firm seedbed. Normal seeding rates are 6 to 22 kg per hectare (5 to 20 lbs per acre) in mixes.

Sources: Readily available from large seed companies.

2. Redtop (Agrostis alba)

Uses: Erosion control, pasture, companion grass in turf seedings and stabilizing ditch and channel banks, grassed waterways, and other disturbed areas.

Description: A coarse, cool season perennial grass with rhizomes (underground stems). Grows to 750 to 1,000 millimeters (30 to 40 inches).

Adaptation: Does better in the cool, humid areas. Will grow under a wide variety of soil and moisture conditions. Grows on very acid soils (pH 4.0 to 7.5) and poor, clay soils of low fertility. While drought-resistant, it is also a useful wetland grass.

Establishment: Has very small seed and requires a compact seedbed. May be sown in early spring or late summer. Seldom seeded alone except as temporary turf. Adequate fertilization is essential on critical areas to obtain good cover rapidly. Most commonly added to mixes, usually 2 to 3 kg per hectare (2 to 3 lbs per acre). Redtop will disappear from a stand under frequent low mowing.

Sources: Available from commercial sources.

LEGUMES -

1. Crownvetch (Coronilla varia)

   Uses: For erosion control of critical areas such as steep roadbanks, surface mine spoil and industrial waste areas. It is also useful as a residential ground cover. It provides high-quality forage for ruminant animals and serves as a wildlife food and cover plant.

   Description: A deep-rooted, cool season, perennial, herbaceous legume with a semi-reclining growth habit. It reaches 0.5 to 1 meter (2 to 3 feet) in height, and does not climb or twine. It fixes nitrogen in the soil and makes a dense mat of vegetative cover.

   Adaptation: It grows best on well-drained soils with a pH range of 5.5 to 8.3. Will persist on more acid soils for a prolonged period once established. It is not adapted to soils with poor drainage. Crownvetch is winter hardy and drought-tolerant. Varieties commonly used are Chemung, Penngift and Emerald.

   Establishment: Only inoculated seed should be used. Requires at least 560 kg per hectare (500 lbs. per acre) of 5-10-10 fertilizer (or the area should be fertilized according to soil test results). Soil acidity must be raised above a pH of 5.5. Crownvetch requires mulch and can be hydroseeded successfully. Seeding in the spring is most successful. Frost seeding may be used on steep or stony sites (seed in late winter, and allow frost action to work the seed into soil). Crownvetch often takes 2 to 3 years to establish a dense stand. A companion grass such as Perennial Ryegrass or Redtop needs to be mixed into the initial planting, but the Crownvetch will eventually crowd out the companion plants. It will not persist under frequent mowing.

   Sources: Available commercially.

2. Flatpea (Lathyrus sylvestris)

   Uses: Flatpea is an erosion control plant that provides a thick mat of vegetative cover, fixes nitrogen in the soil, and can be maintained with a minimum of management. It is useful on roadbanks, dams, borrow area, gravel pits, surface mine spoil, and industrial waste areas. It is an ideal plant for stabilizing logging roads and utility right-of-ways since it will restrict the invasion of many woody species. It also provides good wildlife cover and food.

Description: A cool season perennial legume. It will climb to a height of 2 meters (6.5 feet) if support is available, but the normal height is 1/2 - 1 meters (2 to 3 feet).

Adaptation: Flatpea is adaptable to a wide variety of soil conditions. It is drought-tolerant, cold-hardy, and does well on low-fertility sites such as sands, gravel, and soils from acid sandstones. It is not adapted to wet sites, but it will grow on somewhat poorly drained soils. It will tolerate minor shade and a minor degree of flooding. The optimum pH range is from 6.0 to 6.5. The only available variety is Lathco, developed by the USDA Soil Conservation Service.

Establishment: Use only inoculated seed. The seedbed should be scarified, if possible. The seed is normally drilled or band seeded, but on rough sites or steep slopes, it can be broadcast and then worked into the soil by light dragging. Where possible, a light application of mulch, properly anchored, will assure a good stand. Lime is essential if the soil is below a pH of 5.0. Fertilize according to a soil test or apply 450 kg per hectare (400 lbs per acre) of 10-20-10. Work lime and fertilizer into soil when preparing the seedbed. For a primary stand, use a seeding rate of 15 to 20 kilograms (30 to 40 lbs) in a mixture with 4 to 5 kilograms (8 to 10 lbs) of Perennial Ryegrass or 5 to 8 kilograms (10 to 15 lbs) of Tall Fescue. Flatpea is slow to germinate, so grasses are needed to provide quick cover. Early spring seedings in April or May are best; June seedings are less desirable. Grass seedings may be overseeded with Flatpea from November through March. Flatpea is usually not winter-hardy if seeded in mid or late summer; therefore, dormant seedings are recommended. Mulch with straw at a minimum rate of 3,400 kilograms per hectare (1.5 tons per acre) on all critical sites, and anchor. Little management is required. Remove woody vegetation if the site is invaded. Mowing is acceptable once the stand is established. Mow after full bloom at a 150 millimeter (6-inch) minimum height.

Sources: Lathco is commercially available.

3. Sericea Lespedeza (Lespedeza cuneata)

Uses: Hay, pasture, erosion control, cover crop, wildlife food.

Description: Warm season perennial legume with upright woody stems 300 to 450 millimeters (12 to 18 inches) tall. Roots widely branched penetrating soil 1 meter or more.

Adaptation: Best on well drained, deep soils of medium texture. Will also grow on sandy, rather acidic, infertile soils. Optimum pH range is 6.0 to 6.5,

but will tolerate a range of 5.0 to 7.0. It is drought tolerant. Common varieties are Serala and Interstate.

Establishment: Seed from April to June. Requires a firm seedbed. Use only inoculated seed. Rates vary from 22 to 35 kg per hectare (20 to 30 lbs per acre) of unhulled seed. Requires phosphate and potash. Will not persist under frequent mowing (once a year recommended).

Sources: Seed of common varieties is commercially available.

4. White Clover (Trifolium repens)

Uses: Common White Clover is used mostly for pastures. Ladino clover, a giant white clover, is also used for hay and silage in mixtures with a grass. The thick growing, spreading characteristics of the common type make it ideal for erosion control.

Description: A cool season perennial legume. The common type has a prostrate type of growth, while the Ladino is more upright. Both spread by stolons (horizontal branches along ground) and by roots at the nodes. Representative common varieties used are Tillman, Common and White Dutch. Ladino is the only cultivar for the large type.

Adaptation: Thrives in cool climates and on moist, rich soils with full sun. Will not tolerate extremes of cold or drought. Where soil moisture is not adequate, Ladino is short-lived. Optimum soil pH is 6.5, but it will grow in a range of 5.0 to 7.5. Common White Clover volunteers readily in Bluegrass mixtures where moderate to high fertility is maintained. Stands are persistent.

Establishment: Ladino Clover requires inoculation, fertilizing, and liming for successful growth. Phosphorus and potash are the key fertilizer elements required. Ladino makes a good companion crop with grasses such as Orchardgrass, Bromegrass, Tall Fescue and Timothy. These grasses will normally crowd out the Ladino after 2 to 3 years. Seed should be planted (drilled or broadcast) at shallow depths, and a firm seedbed is desirable.

Sources: Available commercially.